

Spring and summer bring warm temperatures, just right for walking in the woods and other outdoor activities. Warm weather also means that ticks become active and this can lead to the transmission of tick-borne disease.

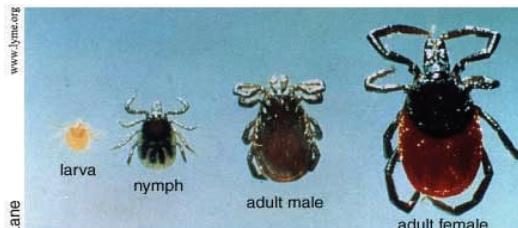
The tick-borne diseases most often found in Virginia are Lyme disease, Rocky Mountain spotted fever, and ehrlichiosis.

## Lyme Disease

Lyme disease, first identified in 1975 in Lyme, Connecticut, is a bacterial illness transmitted by a tick bite. It is caused by *Borrelia burgdorferi*, spiral-shaped bacteria called spirochetes. Although the disease is found more frequently in Northeastern and the upper Midwest states, cases have been reported in Virginia since 1982. The number of cases reported in Virginia has ranged from a low of 54 in 1989 to a high of 259 in 2002. The disease is found mainly in the northern and eastern parts of the state.

## The Tick

The black legged or deer tick (*Ixodes scapularis*, previously called *Ixodes dammini*) is the most common carrier of Lyme disease in the eastern United States. It takes approximately two years for the ticks to complete their life cycle from eggs to adults. The adult deer tick feeds and mates on the white-tailed deer in the fall and winter. In the spring it drops off to lay eggs which hatch into larvae. During the summer, the larvae feed on small rodents, most commonly the white-footed mouse.



If the rodents are carrying the *B. burgdorferi* bacteria that cause Lyme disease, the tick larvae can become infected. Once they feed, the larvae molt into nymphs,

which are dormant during the winter and become active the following spring and summer. If the larvae were infected, the nymphs will also contain the bacteria.

Transmission usually occurs when the nymph is active and feeds on small and large animals, and occasionally on humans (hosts). At the nymph stage, the tick is about the size of a pinhead. By fall nymphs become adults which may also transmit the disease. Transmission by the nymph or adult usually does not occur until the tick has been attached to a host for over 1 to 2 days.

Although black legged or deer ticks are most commonly found in the eastern part of Virginia, they are not as common as American dog and lone star ticks, neither of which transmit Lyme disease. Virginia studies done in the mid 1980s on the Eastern Shore and in the Williamsburg/Yorktown area identified *B. burgdorferi* infected rodents and ticks, but the percentages that were infected were much lower than in other parts of the country where more human cases are reported. There have been no recent studies to see how these infection rates may have changed over time.



Dog tick (*Dermacentor variabilis*), deer tick *Ixodes scapularis*, Lone Star tick (*Amblyomma americanum*)

## The Symptoms

Within three days to a few weeks after being bitten by an infected tick, 70 to 90 percent of people develop a circular or oblong rash, called erythema migrans or EM, at the site of the bite. The EM rash increases to two to three inches in diameter and sometimes to as large as 20 inches. As it enlarges, the center of the rash clears giving it a "bull's eye" appearance. Sometimes multiple rashes occur. Because it does not itch or hurt, EM may

not be noticed by everyone who has the rash.

In addition to, or instead of the EM, headache, fever, muscle and joint aches, and a feeling of tiredness can occur. If left

untreated, Lyme disease can progress to an early phase affecting the joints, nervous system or heart. This occurs several weeks to months after the tick bite. In a small percentage of infected people, late symptoms may occur months to years later with long term nervous system problems or arthritis.

Because the deer tick is so small in its nymph stage, many people are not aware of its bite. If you have been in an area that may contain ticks and you experience any of these symptoms, contact your doctor. State that you may have been bitten by a tick. This is extremely important because the early diagnosis of Lyme disease is usually based on symptoms and history of tick exposure. The available blood tests are not completely reliable and early in the disease they are often negative. On the other hand, there are confirming tests for the late complications of Lyme disease that are usually reliable. Studies have shown that many people who think they have the late stages of Lyme disease actually suffer from other illnesses so getting a second, confirming test for Lyme disease is important.

## The Treatment

When Lyme disease is detected early, it can be mild and easily treated with oral (by mouth) antibiotics such as tetracycline or penicillin. Even in the late stages, Lyme disease usually can be treated successfully with antibiotics, but the treatment lasts longer and is more involved.



Courtesy of American Lyme Disease Foundation

## Rocky Mountain Spotted Fever

Rocky Mountain spotted fever is characterized by a sudden onset of symptoms and can be fatal if not treated. It is caused by bacteria called *Rickettsia rickettsii*. Between 1974 and 1982, an annual average of 112 cases and three deaths were reported in Virginia. In recent years, only about 38 cases and less than one death per year have been reported. Nearly all cases occur in the spring and summer months.

## The Tick

In Virginia, the dog tick (*Dermacentor variabilis*) commonly carries the organism that causes Rocky Mountain spotted fever. The tick is usually attached to a host for four to six hours before it transmits the disease.

## The Symptoms

Early symptoms of Rocky Mountain spotted fever, which start 2 to 14 days after the tick bite, include fever, deep muscle pain, severe headache, chills, and upset stomach or vomiting. Around the third day a red, spotted rash usually appears, beginning on the wrists and ankles. It spreads quickly to the palms and soles and then to much of the rest of the body.



Courtesy of American Lyme Disease Foundation

Blood tests can confirm the presence of the disease, but two tests spaced several weeks apart may be required.

### The Treatment

Treatment should start as soon as possible based on symptoms and history of tick exposure rather than waiting for blood test confirmation. Antibiotics in the tetracycline family are usually administered to treat the disease in adults. Other antibiotics are prescribed for children.

### Ehrlichiosis and Anaplasmosis

Although there are multiple diseases that can be caused by bacteria in the ehrlichia and anaplasma families, the most common in Virginia are human monocytic ehrlichiosis (HME) and human granulocytic ehrlichiosis (HGE, more recently renamed anaplasmosis). HME is transmitted by the lone star tick and HGE by the black legged or deer tick.

### The Symptoms

Symptoms for both HME and HGE can range from very mild to severe and include fever, headache, muscle pain, vomiting, and general discomfort. Early in the disease blood tests indicating low platelet counts and/or high liver enzymes may be helpful with diagnosis, but confirmation requires two specific blood tests spaced several weeks apart.

### The Treatment

Both diseases respond to antibiotics in the tetracycline family and treatment should be based on symptoms (including platelet and liver enzyme tests) and history of tick exposure rather than waiting for confirmatory blood tests.

### Other Diseases

Ticks can transmit other diseases, such as tularemia (rabbit fever) and babesiosis. Tularemia has a sudden onset with fever and chills. An ulcer develops at the site of the tick bite and surrounding lymph nodes

enlarge. Babesiosis is caused by an organism that affects red blood cells. Symptoms include fever, chills, muscle aches, fatigue, and jaundice. Persons who have had their spleens removed or have a weak immune system are more likely to experience severe disease or death from babesiosis. Antibiotics are used to treat both diseases.

### Prevention

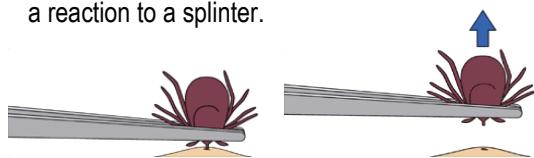
Ticks do not jump or fly onto people or animals. They wait on low vegetation, attach to hosts as they pass by, and crawl upward. The following steps can protect you against ticks and the diseases they carry:

- \* Avoid tick-infested areas such as tall grass and dense vegetation.
- \* Walk in the center of mowed trails to avoid brushing against vegetation.
- \* Keep grass cut and underbrush thinned in yards. Follow directions carefully if chemicals are used for tick control or hire a professional.
- \* Eliminate the living places of small rodents.
- \* Wear light-colored clothing so that ticks are easier to see and remove.
- \* Tuck pant legs into socks and boots. Wear long-sleeved shirts buttoned at the wrist.
- \* Conduct tick checks on yourself, your children and your pets every four to six hours.
- \* Apply tick repellent to areas of the body and clothing that may come in contact with grass and brush. Repellents include those containing up to 50% DEET for adults or less than 30% for children. A repellent/pesticide containing 0.5 percent permethrin may be applied to clothing, but should not be used on skin. Follow directions carefully and do not overuse. Some tick repellents can cause toxic or allergic reactions.
- \* Ask your veterinarian to recommend tick control methods for your pets. Animals can get Lyme disease, Rocky Mountain spotted fever, and ehrlichiosis, but they do not transmit these diseases to humans.

### Tick Removal

Because ticks do not transmit disease until they have been attached to the host for several hours to several days, it is very important to remove ticks as soon as they are found. The following is the best way to remove a tick:

- \* Grasp it with tweezers as close to the skin as possible and gently, but firmly, pull it straight out. Avoid any twisting or jerking motion that may break off the mouth parts in the skin. Mouth parts left in the wound will not transmit the disease, but may cause a minor irritation or infection, similar to a reaction to a splinter.



- \* If tweezers are not available, protect your fingers with gloves, tissue, or a paper towel. Do not touch the tick with bare fingers. The disease-causing organism can enter the body through a break in the skin on your fingers and cause disease.
- \* After the tick has been removed, wash hands with soap and water. Apply an antiseptic to the bite site.
- \* Dispose of the tick by drowning it in alcohol or flushing it down a drain or toilet.
- \* Tick removal using nail polish, petroleum jelly, alcohol or a hot match is not safe.

If you get sick, and you have been exposed to ticks, be sure to tell your doctor about your tick exposure.

For more information, visit our website at:  
[www.vdh.virginia.gov/whc/external\\_whc/westnilevirus.asp](http://www.vdh.virginia.gov/whc/external_whc/westnilevirus.asp)

# PREVENTING TICK-BORNE DISEASES IN VIRGINIA

